

EXHIBIT 3

Alcohol Week

CHEVRON CORPORATION

Inside
Washington
PublicationBIOETHANOL
An exclusive report by Alcohol fuels and feedstocks
LIBRARY Vol. 1 No. 47 December 8, 1986

MAINE CALLS FOR DROPPING MTBE; CITES IT AS GROUNDWATER CONTAMINANT

A report detailing the hazards of methyl tertiary butyl ether (MTBE) as a groundwater contaminant has just been released by the Maine Dept. of Environmental Protection. According to the report, MTBE is not highly toxic but does spread through an aquifer more rapidly than other gasoline components, thereby concentrating the residual gasoline while contaminating drinking wells beyond the radius where gasoline would normally reach. The report concludes that MTBE should either be banned from addition to gasoline or at least stored in extra-secure containers.

MTBE was found to be soluble in water at 4.3%, compared to the relative insolubility of benzene at 0.18%, toluene at 0.05% and xylene at 0.12%. Since benzene, toluene and xylene are more soluble in ethers than in water they, along with the larger hydrocarbon molecules of gasoline, tend to linger and concentrate while the MTBE rushes into fresh water supplies, the report says.

Although Maine has set a maximum contaminant level for MTBE at 50 parts per billion (ppb), concentrations of 690 ppb were discovered in a drinking well near a gasoline/MTBE blend spill. At that site, (continued on page 7)

the concentration of other volatile components was only 10 ppb. The well nearer the spill had concentrations of up to 126,000 ppb gasoline plus MTBE, the report states. At another site, total concentrations exceeded 600,000 ppb in contrast to usual maximum concentrations for gasoline components near spills of only 10-20,000 ppb. The point is that MTBE not only leads other hydrocarbons through the aquifer but, as it spreads away, concentrates the remaining hydrocarbons, one of the authors said.

"Groundwater contaminated with MTBE is difficult to remediate," the report states. Carbon filtration is not cost-effective for MTBE since a 2-cu-ft bed used to treat household water only lasts a month or less at MTBE concentrations of as low as 10 ppb.

The report states that MTBE, now one of the top 50 chemicals produced in the U.S., is a very popular oxygenate in lieu of tetra-ethyl lead. Some 30 plants now produce MTBE; Texas Petrochemicals and ARCO are the largest producers. An additional 20 plants are planned, the report states. Of the U.S. 60,000 barrels/day MTBE production, 95% originates in Texas. MTBE was first produced by ARCO in the 1960s when the company patented a process for removing branched alkenes like isobutylene from hydrocarbon streams, the report states. The isobutylates is then combined with methanol. MTBE was not commercially produced until 1979 and production has increased by about 40% each year since 1980, the report states. It is currently used in about 10% of the U.S. gasoline supply but the proportion of gasolines blended with MTBE is expected to increase dramatically in coming years. Although the U.S. Environmental Protection Agency allows blending up to 11%, it is usually added at between 2% and 7%, and mostly in unleaded premium gasolines.

Claims made about MTBE are that it has an octane blending value greater than that of toluene, reformats or alkylates; is compatible with all types of automobile materials; does not phase-separate as alcohols do; and that its use in gasoline reduces carbon monoxide and hydrocarbon emissions in most cars, the report states.

Not only does MTBE's greater solubility and lower ability to stick with soil and biological particles mean that its plume around a leak is greater than that of other gasoline components, but it also acts as a cosolvent for the gasoline components, thereby dragging them along behind, the report says. "The result is that the sum total of all dissolved gasoline components in groundwater is increased."

Although MTBE is not particularly toxic and is not carcinogenic, it has a "terpene-like" or "chemical" odor. "Our first contamination case, in 1984, was initially mistaken for one of hazardous waste leachate because of the unusual smell," it states. The odor can be detected at water concentrations as low as 20-50 ppb, the report states. Years after a spill, most of the plume will be only MTBE as the other gasoline components are biodegraded.

The report gives four reasons for concern over the toxicity of MTBE and its presence in domestic well water: it is very mobile in groundwater so that its concentration in a well may vary radically from week to week; plumes of MTBE in groundwater are associated with plumes of gasoline with its more varied and toxic components; MTBE is an irritant; and MTBE is probably a nervous system depressant like other ethers, and benzene, toluene and xylene.

MTBE is not the only villain when it comes to gasoline spills, however, the source said. The report offers three approaches regarding the MTBE problem, some of which would indirectly limit other gasoline additives including ethanol and methanol. Firstly, the report states that there is reason enough to call for the abandonment of MTBE as an additive in gasoline stored underground. Similarly, other octane enhancers including ethanol, methanol, and tertiary butyl alcohol may be equally soluble and have similar environmental effects to MTBE. Secondly, if MTBE use must continue, it by itself and when blended in gasoline should be stored only in double-contained facilities.

CH009138